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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/690,604	10/23/2003	Guoqiang Xue	PAT 2147-2	6728

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EXAMINER	
BENGHUZZI, MOHSIN M	
ART UNIT	PAPER NUMBER
2611	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/07/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/690,604	XUE ET AL.	
	Examiner	Art Unit	
	Mohsin (Ben) Benghuzzi	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *23 October 2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 1, 4, and 9 are objected to because of the following:

The claims contain the acronyms 'DTX' and 'CONT', which are acronyms that examiner believes are not know to one of ordinary skill in the art. Examiner suggests that these acronyms are spelled out.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-7 and 9-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yao et al. (US Pub 2002/0159423) in view of Yu et al. (US 6,888,901).

1) Regarding claim 1:

Yao et al. teaches, in a wireless system, a method for determining whether a received frame is an erasure, a DTX mode frame or a CONT mode frame, comprising:

a) decoding said frame to obtain a log likelihood ratio (LLR) $\Lambda(n)$, reflecting the likelihood that a detected symbol is a logic "1" or a logic"0" (paragraph 0043 lines 1-2 and paragraph 0045 lines 1-10);

c) calculating a CRC value for said received frame (paragraph 0037 lines 12-14); and

d) determining whether said received frame is an erasure, a DTX mode frame or a CONT mode frame based on said CRC value and said mean absolute LLR value (paragraph 0046 lines 5-7, paragraph 0032 lines 6-10, and paragraph 0036 lines 13-15, wherein, detection of non-transmitted bits is interpreted as determination of a DTX mode frame and detection of transmitted bits is interpreted as determination of a CONT mode frame, also, paragraph 0037 lines 12-14).

Regarding, computing a mean absolute LLR value m for said received frame, Yao et al. teaches, computing a LLR value m for said received frame (paragraph 0046 lines 5-7), but does not specifically teach computing a mean absolute LLR. However, Yu et al. specifically teaches computing a mean absolute LLR (column 4 line 66 to column 5 line 11).

It is advantageous that the mean absolute value of a LLR is computed for a frame. Computing the mean absolute value of a LLR results in an improved likelihood that the detected symbol "1" or "0" is correct, as the mean absolute value reflects sample values over a period of time and not just at one specific time instant. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include computing a mean absolute LLR, as Yu et al. teaches, in the method of Yao et al., in order to result in an improved accuracy in detecting symbols.

2) Regarding claim 2:

As discussed in claim 1 above, Yu et al. teaches, wherein step b) comprises determining the absolute value $|\Lambda(n)|$ for all LLRs obtained for said frame, and calculating the mean value m of said absolute LLRs (column 4 line 66 to column 5 line 11), using the relationship:

$m = 1/(N+M) \sum |\Lambda(n)|$

where N is the number of data bits and M is the number of CRC bits in said received frame.

3) Regarding claim 3:

Yao et al. teaches the method of claim 1, wherein said step c) comprises:

making a hard decision $d(n)$ on each said $\Lambda(n)$, whereby a logic"1" is declared whenever said $\Lambda(n)$ is less than 0, and a logic "0" otherwise (paragraph 0045 lines 6-10 and paragraph 0060 lines 1-3); and

calculating said CRC value based on said hard decisions $d(n)$ (paragraph 0037 lines 12-14).

4) Regarding claim 4:

Yao et al. teaches, wherein said step d) comprises:

declaring said received frame as a CONT frame if said CRC value indicates a successfully recovered frame, and $m > T$ (paragraph 0037 lines 12-14, paragraph 0032 lines 6-10, and paragraph 0036 lines 13-15, wherein, detection of transmitted bits is interpreted as determination of a CONT mode frame).

declaring said received frame as a DTX frame if $m < T$ (paragraph 0032 lines 6-10, and paragraph 0036 lines 13-15, wherein, detection of non-transmitted bits is interpreted as determination of a DTX mode frame), and

declaring said received frame as an erasure if said CRC value indicates a failed frame, and $m > T$ (paragraph 0046 lines 5-7).

Regarding, establishing a threshold T for said mean absolute LLR value m, Yu et al. teaches, establishing a threshold T for said mean absolute LLR value m (column 5 line 6).

5) Regarding claim 5:

Yao et al. teaches a method of detecting the transmission rate of a voice frame in a wireless system comprising:

a) decoding said voice frame for each of a plurality i of possible transmission rates $j(i)$ (paragraph 0032 lines 1-10 and paragraph 0037 lines 7-10).

b) for each said $j(i)$ rate, computing a $CRC(i)$ value (paragraph 0037 lines 12-14); and

c) determining the transmission rate based on said mean absolute LLR value for said voice frame (paragraph 0032 lines 1-10 and paragraph 0037 lines 7-10).

Regarding, for each said $j(i)$ rate in step b), computing a mean absolute LLR value $m(i)$, as discussed in claim 1 above, Yu et al. teaches, computing a mean absolute LLR value $m(i)$ (column 4 line 66 to column 5 line 11).

6) Regarding claim 6:

Yao et al. teaches the method of claim 5, wherein said step c) comprises determining the maximum of all said values *m(i)* (paragraph 0055 lines 2-5); verifying if the *CRC(i)* value corresponding to said maximum indicates a successful reception of said voice frame (paragraph 0037 lines 12-14); and declaring the rate corresponding to said maximum as said transmission rate (paragraph 0032 lines 1-4, wherein, 'rate matching' is interpreted as declaring the rate corresponding to said maximum as said transmission rate).

7) Regarding claim 7:

Yao et al. teaches the method of claim 6, further comprising erasing said voice frame if the *CRC(i)* value corresponding to said maximum indicates a failed reception of said voice frame (paragraph 0052 lines 5-8 and paragraph 0032 lines 1-4, wherein, 'rate matching' is interpreted as determination the transmission rate).

8) Regarding claim 9:

Yao et al. disclose a receiver for a wireless communication system for recovering information transmitted in a frame, comprising:

means for decoding a received frame to obtain a log likelihood ratio (LLR) *Λ(n)* value reflecting the likelihood that a detected symbol *s(n)* is a logic "1" or a logic'0" (paragraph 0043 lines 1-2 and paragraph 0045 lines 1-10);

means for calculating a CRC value for said received frame (paragraph 0037 lines 12-14); and

means for determining whether said received frame is an erasure, a DTX mode frame or a CONT mode frame based on the CRC value and said mean absolute LLR value (paragraph 0046 lines 5-7, paragraph 0032 lines 6-10, and paragraph 0036 lines 13-15, wherein, detection of non-transmitted bits is interpreted as determination of a DTX mode frame and detection of transmitted bits is interpreted as determination of a CONT mode frame, also, paragraph 0037 lines 12-14).

Regarding, means for computing a mean absolute LLR value m for said received frame, Yao et al. discloses, means for computing a LLR value m for said received frame, but does not specifically disclose means for computing a mean absolute LLR. However, as discussed in claim 1 above, Yu et al. specifically discloses, means for computing a mean absolute LLR (column 4 line 66 to column 5 line 11).

9) Regarding claim 10:

Yao et al. disclose the receiver of claim 9, wherein said frame is a data frame and said means for decoding comprises a turbo decoder (paragraph 0029 lines 1-3 and paragraph 0043 lines 1-4).

10)Regarding claim 11:

As discussed in claim 9 above, Yu et al. discloses, wherein said means for computing a mean absolute LLR value comprises means for determining the absolute value $|\Lambda(n)|$ for all LLRs obtained for said frame, and means for calculating the mean value of said absolute value $|\Lambda(n)|$ (column 4 line 66 to column 5 line 11).

11)Regarding claim 12:

Yao et al. disclose the receiver of claim 10, wherein said means for calculating a CRC value comprises:

a hard decision unit for converting each $\Lambda(n)$ value that is less than 0 into a logic decision "1" and converting any other $\Lambda(n)$ value into a logic decision "0" (paragraph 0045 lines 6-10 and paragraph 0060 lines 1-3); and

a CRC unit for calculating a CRC value based on said logic decisions (paragraph 0037 lines 12-14).

12)Regarding claim 13:

As discussed in claim 9 above, Yu et al. discloses, wherein said means for calculating the mean value has a transfer function (column 4 line 66 to column 5 line 11):

$$m = 1/(N+M) \sum |\Lambda(n)|$$

where N is the number of data bits and M is the number of CRC bits in said received frame.

13)Regarding claim 14:

Yao et al. disclose the receiver of claim 9, wherein said frame is a voice frame and said means for decoding comprises an SISO decoder (paragraph 0029 lines 1-3 and paragraph 0043 lines 4-6).

14)Regarding claim 15:

Yao et al. discloses the receiver of claim 14, wherein said means for decoding comprises:

a de-interleaver for separating said voice frame from a repeat variant of said voice frame (block 264 in Fig. 2B);

decoding means operating at *i* different rates to provide a respective *CRC(i)* value for each said rate (paragraph 0032 lines 1-10, paragraph 0037 lines 7-10, and paragraph 0037 lines 12-14);

a decision logic unit for receiving said *CRC(i)* values and said *m(i)* values and determining the rate of said voice frame (paragraph 0055 lines 2-5, paragraph 0037 lines 12-14, and paragraph 0032 lines 1-4); and

means for establishing operation of said decoding means at said rate (paragraph 0055 lines 2-5, paragraph 0037 lines 12-14, and paragraph 0032 lines 1-4).

Regarding, decoding means operating at *i* different rates to provide a respective mean absolute LLR value *m(i)* for each said rate, Yao et al. discloses, decoding means operating at *i* different rates to provide a respective LLR value *m(i)* for each said rate, but does not specifically disclose decoding means to provide a respective mean absolute LLR. However, as discussed in claim 1 above, Yu et al. specifically discloses, decoding means to provide a respective mean absolute LLR (column 4 line 66 to column 5 line 11).

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yao et al. (US Pub 2002/0159423) and Yu et al. (US 6,888,901), and further in view of Chen (US 5,751,725).

Yao et al. or Yu et al. do not teach, wherein said transmission rates are a full rate corresponding to full voice activity, an 8th rate corresponding to silence, a half rate, and a quarter rate. However, Chen teaches, wherein said transmission rates are a full rate corresponding to full voice activity, an 8th rate corresponding to silence, a half rate, and a quarter rate (column 5 lines 1-10).

It is desirable that frames are transmitted at full rate, an 8th rate, a half rate, or a quarter rate. Transmission with such various rates results in an efficient use of channel bandwidth, as data transmission rate is set depending on bandwidth of voice signal to be transmitted. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to set the transmission rate in the method of Yao et al. and Yu et al. to one that is a full rate, an 8th rate, a half rate, or a quarter rate, as Chen teaches, in order to result in an efficient use of channel bandwidth.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Morita et al. (US Pub 2003/0043487) discloses an apparatus having an error correction function that includes an erasure detector and an iterative SISO decoder.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mohsin (Ben) Benghuzzi whose telephone number is

(571) 270-1075. The examiner can normally be reached Monday through Friday, 8:30am- 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

7. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Mohsin (Ben) Benghuzzi January 24, 2007

MOHAMMED GHAYOUR
SUPERVISORY PATENT EXAMINER